

On a Collection of Non-Marine Mollusca from the Southern Sudân. By JANE LONGSTAFF, F.L.S. With Descriptions of Three New Species, by H. B. PRESTON, F.Z.S.; and Notes on *Veronicella nilotica*, by G. C. ROBSON, B.A.

(PLATES 17, 18.)

[Read 4th December, 1913.]

SINCE many travellers in the region of the Upper Nile have collected mollusca, which have been recorded either by themselves or others, it might seem almost superfluous to write further on the subject. Unfortunately, however, some authors have not been careful to give exact localities, while others have founded new species on one or two specimens, or even on immature ones. It may, therefore, not be devoid of interest to have an account of a collection from the Sudân detailed both with regard to localities and numbers.

This collection was made almost entirely on the White Nile, in the years 1909 and 1912. A visit each year to the mouth of the river near Mogran was very fruitful, but still more so were two trips up the river in comfortably equipped Government steamers. The first time we went, between the 16th and 21st of February, we did not get further than Gebel Ên on the right bank (lat. $12^{\circ} 37' N.$). The second journey took place between February 1st and 23rd, and extended to Gondokoro in Uganda on the same bank (lat. $4^{\circ} 54' N.$), and also about eight miles beyond to Rejâf on the opposite bank (lat. $4^{\circ} 45' N.$), in the Lâdô Enclave, now forming part of the Anglo-Egyptian Sudân.

The distance traversed in steaming up the White Nile from Khartûm (lat. $15^{\circ} 37' N.$) was 1128 miles. North of Lake No (lat. $9^{\circ} 30' N.$) the river is called Bahr al-Abyad; it is fairly wide and the shores are more or less shelving. South of Lake No, where the river is called Bahr el-Gebel, we passed for many hours through the Sadd, which is composed of masses of vegetation, much of it floating; still further south the shores were usually steeper, occasionally forming cliffs, while sometimes rocks cropped out in the bed of the river.

We went a little way up the tributaries Sobat and Bahr el-Zarâfa; the latter runs almost parallel with the Bahr el-Gebel, leaving it in lat. $7^{\circ} 0' N.$, and entering the Bahr al-Abyad in lat. $9^{\circ} 25' N.$

In addition to collecting on the White Nile I had the opportunity of spending a few hours at Sôba, about fifteen miles up the Blue Nile, in lat. $15^{\circ} 32' N.$, and also a short time at Khor Surkab, near Kerreri, on the united rivers below Khartûm, in lat. $15^{\circ} 46' N.$

While ascending the White Nile numerous stoppages were made, and I

obtained specimens at thirty places, some of which were visited twice. Though the managers of the steamers were most obliging in trying to suit the tastes of all the passengers, these halts were only too few and too short to satisfy collectors, while sometimes the best hunting ground was just discovered as the steamer had to start again. A collection made under such circumstances cannot be exhaustive, and indeed must be regarded only as a contribution towards our knowledge of the Molluscan fauna of the region. The shells were all taken in the river or within one, or at most two, miles from its margin. Many were obtained either by means of a long handled scoop, by boys wading, or in the case of the larger ones, such as *Ætheria*, through native fishermen, who caught them in their nets. Others, again, were stranded by the subsiding water of the river, when they often contained the animal alive or but recently dead. Small gasteropods as well as the large *Ampullaria* were found on marshy ground close by, and the former also on water-plants in the river.

With regard to distribution it is unnecessary to say much here, as it is given in the notes on each species. It may, however, be pointed out that the range is interesting in a twofold way.

First, the geographical position of the Nile causes it to carry the drainage of the region of the Great Lakes down to the Mediterranean, giving rise to a commingling of Ethiopian and Palæarctic forms.

As might be expected, the freshwater molluscan fauna presents, with few exceptions, the same character throughout. But it is otherwise with the land-shells, for *Helix desertorum* is left behind and distinctly tropical forms take its place.

Secondly, there is the fact of species extending far beyond the Nile Region over the continent of Africa. Among the bivalves, *Spatha rubens*, for instance, ranges from Lower Egypt to Uganda, and also to Senegal and the Congo; *S. wahlbergi* occurs near Khartûm and extends thence southwards to the Transvaal, as well as westwards across to the Ngadda River in Nigeria. And the large gasteropod *Burtoa nilotica* extends from the Bahr el-Gebel to Matabele Land in the south, to Lake Tchad in the west, and to the Juba River in the east.

If we consider merely the district of which I have had a more or less limited experience, we must observe that *Cleopatra bulimoides* is by far the most frequent and abundant freshwater gasteropod. It occurs in both Palæarctic and Ethiopian regions, and though so common, is interesting as exhibiting a considerable amount of variation. *Ampullaria wernei*, a distinctly Ethiopian species, is not only numerous but, on account of its great size, it is also conspicuous.

As it was the dry season terrestrial gasteropods were scarce, and they were more especially so in 1912, because there had been less rainfall than usual

during the previous rainy season. Those collected were all dead except a single specimen of *Veronicella nilotica*, Cock., found at Hillet al-Nûwêr, a small islet in the Sadd, and only one example of *Limicolaria*, which was taken at Kâkâ, contained even a dead animal. No land-shells were seen north of Abba Island (lat. $13^{\circ} 22' N.$), where we met with the first specimens of *Limicolaria*, of which genus the individuals became more numerous further south. Sheik Tombê, on the Bahr el-Gebel, was the best place we stopped at for land mollusca, but unfortunately, after a violent thunderstorm there were such torrents of rain that I was unable to go ashore. I was therefore indebted to my husband and fellow-passengers for the specimens obtained.

The practice of setting fire to the vegetation in the southern districts was most detrimental to the gasteropoda, and many were more or less calcined.

No Lamellibranchiata were met with south of Lake Shâmbê with the exception of immature specimens of *Corbicula* and *Sphaerium* at Gondokoro. Possibly the steep character of the shores as well as my not having facilities for deep-water dredging is answerable for this, since I always found bivalves most numerous where the margin of the river was shelving. They were especially abundant on the flat lower reaches of the Bahr al-Abyad, where wading and other birds also abounded, and probably they afforded food for the latter, for several shells taken had angular breakages as if made by birds. On the muddy flats near Mogran specimens of *Mutela* and *Nodularia* were very numerous. Quite the rarest species met with was *Pseudomutela plicata*, von Marts., of which I only obtained one example at Gebel Ahmad Aghâ.

During the present century four collections from the Upper Nile have been described, and in most cases accurate localities have been given.

The first was made by Capt. Flower, F.L.S., and recorded in the Proc. Zool. Soc. 1900, p. 970. He obtained eleven species in the Bahr al-Abyad and Bahr el-Zarâfa, none of which was new to science.

The second was the result of the Swedish Zoological Expedition to the district between Shendi, lat. $16^{\circ} 42' N.$, and Fâshôda (Kôdôk), lat. $9^{\circ} 54' N.$, during the period from February until May in 1901. Twenty species and four varieties were taken, and afterwards recorded by Herr Richard Hägg (1904). One of the latter, a variety of *Limicolaria sennaariensis*, Shutt. (*flammata*, Caill.), he regarded as new.

The third collection was made by Dr. Innes Bey on the White Nile, and described by M. Pallary (Bull. Inst. Égypt. ser. 4, no. 3, March 1902). Few of the localities visited are given, and the date is not stated. Twenty-four species are enumerated; two gasteropods are not specifically denoted; three lamellibranchs are new, and two others, *Unio euryssellinus*, Letourn., and *U. mysticus*, Bourg., have since been regarded by M. Pallary as varieties of *Nodularia nilotica*, Caill.

The fourth collection was made by Dr. Otto le Roi, of Bonn, and described by Dr. C. B. Boettger and Dr. F. Haas in Proc. Malac. Soc., Sept. 1913. Twenty-four species are recorded ; as five of these occurred in the Bahr el-Ghazâl exclusively, and two in the Nile further north, we are only concerned with seventeen. Of these one form, *Limicolaria koenigi*, is regarded as a new species.

Of course these collections have many species in common ; allowing for this we have a total of forty-four in all.

I obtained fifty-three species, as well as several varieties, on the White Nile—thirty-four species of Gasteropoda, and nineteen of Lamellibranchiata. Two are new, both Gasteropods, which occurred in the Bahr el-Gebel ; one is a species of *Streptaxis*, the other of *Segmentina*. In the Blue Nile, in addition to several common molluscs, I found a new species of *Nodularia*. Four species of Gasteropoda from the Bahr el-Gebel are too imperfect to name. Six or seven other species appear to be new records for the White Nile, viz. :—*Limicolaria turriiformis*, v. Marts., *L. smithi*, Preston, *Limnæa cailliaudi*, Bourg., *Isidora dybowskii*, Fischer, *Sphærium teilhardi*, Pallary, *Eupera letourneuxi*, Bourg., and perhaps *Veronicella nilotica*, Cock. It is not clear whether the last-named species occurred on the White Nile previously or not. The only record of the habitat of the holotype is “by the Nile above Khartûm.” By Nile is probably meant Bahr al-Abyad, and the mollusc may well have been brought down from above by floating Sadd.

I have in addition six or seven species which have been previously recorded by earlier collectors, as well as thirty-three of the same species as those in the four recent collections just quoted. These contain also twelve species * which I did not meet with, making a grand total of sixty-five species for the White Nile exclusive of the region to the west of Lake No and south of Rejâf. Since authorities differ in opinion as to what should be regarded as a species, any numerical statement must be regarded as approximate only.

On our voyages up the White Nile our fellow-passengers were most kind in bringing me all the land-shells they found, and I must especially mention Messrs. Backhouse, Gwynne, and Wallace. I am greatly indebted to M. Pallary for naming specimens, and to Mr. E. A. Smith and Mr. Robson for their courtesy in affording me facilities for studying in the British Museum (Nat. Hist.), and to Mr. Preston for valuable assistance in many ways.

* These are *Cleopatra verreauxiana*, Bourg. (Hägg), *Bithynia boissieri*, Charp. (Hägg), *Lanistes ovum*, Peters (Boettger), *Hydrobia schweinfurthi*, Jickeli (Hägg), *Planorbis pæteli*, Jickeli (Pallary), *Isidora sericina*, Jickeli (Hägg), *Physa subopaca*, Lam. (Pall.), *Physopsis* sp. ? (Pall.), *Succinea rugulosa*, Morelet (Hägg), *Limicolaria kordofana*, Shutt. (Pall.), and *L. connectens*, von Maris. (Boettger). I have not counted *Corbicula radiata*, Parr. and *C. pusilla*, Parr., as Pallary considers them merely immature forms.

In order to save space I have only given sufficient references to identify each species. Also, with a few exceptions, only the names of works on the subject published since 1908, as Herr Hägg and M. Pallary have compiled complete lists of those prior to that date.

Class GASTEROPODA.

Order PROSOBRANCHIATA.

Suborder MONOTOCARDIA.

Section Tænioglossa.

Family HYDROBIIDÆ.

Subgenus GABBIA, *Tryon*.

GABBIA SENNAARICA, *Küster*.

Paludina sennaarica, Parreyss in Küster, 1853, 'Syst. Conchyl.-Cab.' p. 44, pl. 9. fig. 10.

Gebel Én (two), Bahr el-Zarâfa (five), small living specimens numerous amongst weeds in Lake Shâmbê, and Kanisa (one). Confirmed by M. Pallary. He states that the species occurs "Tout le cours du Nil et de ses affluents." Bourguignat records it from Abyssinia and the Blue Nile.

The largest example was found at Gebel Én; it measures, alt. 5·75, diam. 4 mm. Another from Bahr el-Zarâfa is nearly as big, measuring alt. 5·5, diam. 4 mm.

The specimens from these two localities have the spire slightly higher than some I got in ponds near the Pyramids of Gizeh, which M. Pallary considered typical.

Family VIVIPARIDÆ.

Genus VIVIPARA, *Lamarck*.

VIVIPARA UNICOLOR, *Oliv*.

Cyclostoma unicolor, Olivier, 1804, 1812, 'Voy. Emp. Ottoman,' vol. ii. p. 39, vol. iii. p. 68, Atlas ii. pl. 31. fig. 9.

Thirty-five specimens were taken at the following localities:—near Mogran (six), Abba Island (six), Ad-Duwêm (one), Hillet Abbâs (five), Masran Island (two), Gebel Én (three), Kôdôk (one), Wâw (one), Hillet al-Nûwêr (two), and in Lake Shâmbê (eight).

The shells from Mogran and Ad-Duwêm have smooth, convex whorls with occasional vestiges of spiral lines, or of an angle on the upper whorls, or subangularity on the body-whorl. Nearly all the rest are distinctly biangular (var. *biangulata*, Küst.) with intermediate moniliform lines. In several of the specimens from Abba Island, Hillet Abbâs, Gebel Ên, Kôdôk, and Lake Shâmbê, hairs are attached to the "beads." On a shell from Kôdôk the hairs are remarkably long, some measuring 1.25 mm. in length. These hairy individuals are like those named by Frauenfeld, *V. capillata*, but since they do not differ in other respects from *V. unicolor* they can hardly be considered more than a variety. The specimens of this species I found in ponds near the Pyramids of Gizeh nearly all show traces more or less defined of moniliform spiral lines, but I did not observe hairs on any of them; of course this might arise from carelessness in cleaning them, for the hairs would be easily rubbed off.

The largest shell is from Hillet Abbâs; it measures alt. 20.5, diam. 17.5 mm. Some of the others are nearly as big.

V. unicolor is reported throughout Egypt and the whole basin of the Nile from the Victoria Nyanza, Albert Nyanza, Lake Dembea, East Africa, Lake Tchad, and Senegal. Also sub-fossil in the Fayûm.

Subgenus CLEOPATRA, *Troschel*.

CLEOPATRA BULIMOIDES, *Oliv.*

Cyclostoma bulimoides, Olivier, 1804, 1812, 'Voy. Emp. Ottoman,' vol. ii. p. 39, vol. iii. p. 68, Atlas ii. pl. 31. fig. 6.

This species was taken at intervals along the whole length of the White Nile between the mouth near Mogran and Gondokoro. A certain amount of variation was observed, some having smooth convex whorls and others carinated ones, the spiral angle differed somewhat; also the colour varied from light horn to almost black, or there were dark stripes on a paler ground. None of these characters are of sufficient note to be deemed worthy of specific significance, but it may be of interest to record the extent of their occurrence at different localities. It will be observed that striped and keeled shells were more numerous than unicolorous smooth ones in comparison with the number taken, higher up the river than at the mouth.

Near Mogran were found one hundred and seventy-five examples; twenty-four have keels, but on only one is the keel continued to the body-whorl. Eighteen are striped, the rest unicolorous. The largest consists of six whorls, it measures alt. 16, diam. 10 mm. A more slender form has five and a half whorls which measure, alt. 12, diam. 7 mm.

Ad-Duwêm: six, only one striped.

Tawîla : eleven all dead, only six in tolerable condition, they are striped and three are bicarinate.

Hillet Abbâs : ten, all decollated, five striped, four bicarinate.

Masran Island : four, decollated and striped.

Gebel Ên : seventy-eight, mostly decollated, thirty-seven with both keels and stripes, eleven unicolorous with keels, generally uncarinate, but a few bicarinate. Twenty-three simply striped.

Gebel Ahmad Aghâ : two dead, decollated and striped.

Kâkâ : nineteen decollated and some much eroded, all striped and six bicarinate.

S. of Melût : two dead, striped.

Lake Shâmbê : ten, all striped and keeled, the greater number bicarinate. Colour so dark that the stripes hardly show.

Gondokoro : one alive, more elongated than usual as the whorls are more exsert ; it is decollated, striped, and bicarinate. Alt. 14, diam. 7.5 mm. Whorls five. If this shell were compared with one of the broader forms from Mogran without the intervening links, each would probably be considered a distinct species.

Reported from Lower and Upper Egypt, the whole basin of the White Nile up to the Victoria Nyanza ; Abyssinia, Lake Rudolf, Mombassa, Zanzibar, Angola, and Senegal.

Family AMPULLARIIDÆ.

Genus AMPULLARIA.

AMPULLARIA KORDOFANA, *Phil.*

Ampullaria kordofana, Philippi, 1851, 'Conchyl.-Cab.' ed. 2 : Genus *Ampullaria*, p. 44, pl. 13. fig. 1.

About thirty specimens were taken, many of which are immature, and in that state they are difficult to distinguish from *A. vernei*, Phil. They occurred at Tawîla, Kosti, Hillet Abbâs, Masran Island, Gebel Ên, Renk, south of Melût, Bahr el-Zarâfa (southern end), and Hillet al-Nûwêr.

An example from Kosti, having the apex broken and four whorls intact, measures alt. 66, diam. 56.5; aperture, alt. 48, diam. 30 mm.

A specimen from the Bahr el-Zarâfa has a higher spire than usual and thus resembles a variety called *elongata* by Rochebrune and Germain (Mém. Soc. Zool. France, 1904, vol. xvii. p. 5). They state that their shell corresponds with that figured by Bourguignat in Moll. Nouv., Litig. &c., 1863, p. 78, pl. 11. fig. 13. The dimensions they give are alt. 70-78, diam. 65-69; aperture, alt. 50-55, diam. 35-38 mm. Locality, River Omo, at a height of

600 metres. My specimen is larger but has much the same proportions; it measures, alt. 82, diam. 70; aperture, alt. 56, diam. 37 mm. It has only three whorls preserved, the apex being broken.

This species is common in all the lakes and rivers of Egypt as well as throughout the whole Nile basin; it also occurs in Abyssinia. It has thus a more extended range northwards than *A. werneli*.

AMPULLARIA WERNELI, Phil.

Ampullaria werneli, Philippi, 1851, 'Conchyl.-Cab.' ed. 2: Genus *Ampullaria*, p. 19, pl. 5. fig. 4, and pl. 17. fig. 2.

About fifty specimens were taken. The species occurred throughout the course of the White Nile traversed, namely at Abba Island, both opposite Fashi Shoya and also at Tawila, Kosti, Hillet Abbâs, Gebel Én, south of Melût, Lûl, Wâw, Taufikiyâ, Dûlêb (Sobat River), Bahr el-Zarâfa, Lake Shâmbê, Kanîsa, and Rejâf Wooding Station. I am uncertain whether to refer a number of immature shells found at Malek to this species or to *A. kordofana*.

A large individual from Hillet Abbâs consisting of six whorls measures, alt. 103, diam. 97; aperture, alt. 77, diam. 45 mm. It was alive, as well as another nearly as big. Shells from Tawila almost equal these in dimensions, and the operculum belonging to a still larger shell was found at Gebel Én.

A. werneli has been reported from near Kassala to the north and throughout the basin of the Upper Nile southward to the Great Lakes, as well as westward in the Bahr el-Ghazâl and Chari River. Von Martens mentions a variety which was collected by Prof. Peters in Querimba Island.

LANISTES CARINATUS, Oliv.

Cyclostoma carinata, Olivier, 1804, 1812, 'Voy. Emp. Ottoman,' vol. ii. p. 39, vol. iii. p. 68, Atlas ii. pl. 31. fig. 2.

This species was found at intervals throughout nearly the whole distance traversed, namely at Ad-Duwêm, Abba Island, Kosti, Hillet Abbâs, Masran Island, Gebel Én, Renk Wood Station, Mashra Zarâfa Wood Station, Kâkâ, S. of Melût, Kôdôk, Lûl, near each end of the Bahr el-Zarâfa, Lake Shâmbê, Kanîsa, Malek, and Sheik Tombê. Of the sixty specimens taken, many were living; the largest, however, which is from Kâkâ, was dead and devoid of epidermis.

Lanistes carinatus occurs both in Lower and Upper Egypt; in the Sudân being reported from Sennaar on the Blue Nile, and the Bahr el-Ghazal as well as its tributary the Djur, and, as noted above, in the White Nile up to the borders of Uganda, in the Victoria Nyanza, Lake Dembea, and as far east as the Tana River. It also is found fossil in Recent and Post-Pliocene deposits in Egypt, and in Miocene beds near the Victoria Nyanza.

Subgenus LANISTES, *Montfort*.LANISTES INNESI, *Pallary*.

Lanistes innesi, Pallary, 1902, Bull. Inst. Égypt. ser. iv. no. 3, p. 91, pl. 1. fig. 2.

Fourteen specimens were found at a short distance from the mouth of the Bahr el-Zarâfa, all dead, only one with the epidermis well preserved and three with fragments of it. The umbilicus varies in different individuals; in two it is completely covered by the reflection of the inner lip, in two uncovered, and in the rest it is partially covered. It greatly resembles *L. purpureus*, Jonas (*Ampullaria purpurea*, 1839, Archiv f. Naturgesch. vol. i. p. 342, pl. 10. fig. 1), and may be a variety of that species. It is distinguished by the spire having the contour less flattened, the whorls more convex, sutures deeper, and the lines of growth coarser. The height of the spire varies somewhat; the best preserved specimen measures alt. 51·5, diam. 40 mm.; whorls six. The largest measures alt. 56, diam. 40 mm.; whorls seven.

The holotype was obtained by Dr. Innes Bey on the White Nile, but the exact locality is not given. I have seen the shells in the British Museum (Nat. Hist.) taken by Captain Flower in the Bahr el-Zarâfa which were referred by him to *L. purpureus*, and I find that they are conspecific with *L. innesi*, Pallary.

Family MELANIIDÆ.

Genus MELANIA, *Lamarck*.MELANIA TUBERCULATA, *Müll.*

Nerita tuberculata, Müller, 1774, 'Verm. Terr. et Fluv. seu Anim. Infus., Helmin. et Testac., non Marin., Succ. Hist.' vol. ii. p. 191.

This widely distributed species was taken near Mogran, at Ad-Duwêm, Tawila, Masran Island, Gebel Én, Kâkâ, near Melût, in Lake Shâmbê, where it was especially numerous, and at Gondokoro.

All the specimens are decollated except a few very young ones which have the protoconch preserved.

Order PULMONATA.

Suborder BASOMMATAPHORA.

Family LIMNÆIDÆ.

Genus LIMNÆA, *Lamarck*.LIMNÆA CAILLIAUDI, *Bourg.*

Limnæa cailliaudi, Bourguignat, 1883, 'Hist. Mal. Abyssinie,' pp. 89, 90, figs. 100-101.

Five living specimens were found: at Gebel Én (two), Bahr el-Zarâfa (two),

and at Hillet al-Nûwêr (one). They were near the edge of the river and are small. M. Pallary, who kindly examined them, considers them immature. One from Gebel Ên has the spire more produced and resembles *L. acroxa*, Bourg. (op. cit. fig. 94), which M. Pallary also thinks is an immature stage of this species. He states that *L. cailliaudi* is found in the "Cours du Nil Bleu et du Grand Nil." He has not, however, recorded it in his descriptions of the Innes Bey Collection; neither has the Swedish Expedition noted its occurrence in the White Nile. Bourguignat reports it in addition from Lake Dembea.

This seems to be a new record of its existence in this region.

Genus PLANORBIS, Guettard.

PLANORBIS BOISSYI, Pot. et Mich.

Planorbis boissyi, 1838, Potiez et Michaud, 'Galerie de Douai,' vol. i. p. 208, pl. 21. figs. 4-6.

I met with this species both to the north and south of Lake No, and took eighteen specimens in all: at Abba Island (two), Hillet Abbâs (four), Gebel Ên (five), north end of Bahr el-Zarâfa (three), south end (one), and Hillet al-Nûwêr (three). The Swedish Expedition appear to have been the first to find it in the White Nile, and they obtained numerous young examples at Gebel Ahmad Aghâ, none of which is as large as my biggest, which measures, alt. 3.5, diam. 12 mm. This species is also recorded from Lower Egypt.

PLANORBIS MAREOTICUS (Letourn. MS.), Innes.

Planorbis mareoticus, 1884, Walter Innes, Bull. Soc. Malac. France, vol. i. p. 339.

Only one dead specimen in Lake Shâmbê, which I sent to M. Pallary, who kindly determined it. He had previously recorded some examples of the species found by Dr. Innes Bey in the marshes of the White Nile.

It is doubtful whether this should be separated from *P. ehrenbergi*, Beck (*P. cornu*, Ehrenb.). Dr. Innes Bey and M. Pallary consider the species distinct, restricting the name *ehrenbergi* to specimens with convex whorls and *mareoticus* to those with sharply keeled whorls. Jickeli and M. Ancey regard them as conspecific because there are numerous intermediate forms.

Prof. Schweinfurth took specimens of *P. cornu*, Ehrenberg (which is probably identical with this) in the Bahr el-Ghazâl. It also occurs in Lower Egypt.

PLANORBIS COSMIUS, Innes.

Planorbis cosmius, 1884, Walter Innes, Bull. Soc. Malac. France, vol. i. p. 335.

I took but a single specimen of this small form at Kanîsa, which I sent to M. Pallary, as I thought it might be the same as some examples from the White Nile referred to by him in Bull. Inst. Égypt. p. 90, which he did not name. He replied that it was conspecific and suggested my comparing it with *P. cosmius*, Innes. It agreed with the description by Dr. Innes Bey, who considers the species to be the Egyptian representative of *P. spirorbis*. I therefore compared it with British specimens of that species, and found that it comes nearest to the variety *ecarinata*, Jeffr.; it is, however, lower, and the last whorl is wider. Jickeli * writes of a new species of *Planorbis* having very narrow flat whorls which was found by Prof. Schweinfurth in the Bahr el-Ghazâl. This also may possibly be *P. cosmius*.

Dr. Innes Bey had previously found other specimens near Ramleh.

Subgenus SEGMENTINA, *Fleming.*SEGMENTINA ANGUSTA, *Jickeli.*

Four specimens were met with. Bahr el-Zarâfa (one living), Hilet al-Nûwêr (one dead), Kanîsa (two living). The largest has a diam. of 3·5 mm. Jickeli states that this species is very rare; he reports it from the White Nile, Bahr el-Ghazâl, and Abyssinia. Dr. Boettger received one example only from the Bahr el-Ghazâl.

SEGMENTINA KANISAËNSIS, sp. nov.

Five examples taken in marshy pools near the river at Kanîsa.

A description by Mr. Preston is given in Appendix I., p. 265.

Genus ISIDORA, *Ehrenberg.*ISIDORA BROCCII, *Ehrenb.*

Isidora broccii, Ehrenberg, 1831, 'Symb. Phys.' No. 2.

Physa broccii, Bourguignat, 1862, 'Paléontol. Alg.' p. 84, pl. 5. fig. 20.

Two examples from Gebel Én. The largest measures, alt. 7·5, diam. 4·75 mm. Bourguignat gives alt. 8-10, diam. 6-7 mm.

This species is chiefly distinguished from *I. truncata* by its higher spire and narrower body-whorl.

It has been reported from Egypt, Algeria, and Syria.

* 'Fauna der Land- u. Süßwasser-Mollusken N.O.-Afrikas,' Nova Acta der K. Leop.-Carol. Deutsch. Akad. d. Naturf. vol. ii. 1874, p. 217.

ISIDORA TRUNCATA (Fér.), Bourg.

Physa truncata, Férussac, Audouin, 1826, 'Explic. Sommaire des Planches Moll. Égypte et de la Syrie par Savigny,' vol. i. pl. 4, p. 33. Savigny, 'Descr. de l'Égypte,' 1812, pl. 2. fig. 27.

Physa truncata, Bourguignat, 1856, 'Amén. Malac.' vol. i. p. 176, pl. 21. figs. 5-7.

Four specimens were found at Hillet Abbâs and two at Gebel Én on water-plants at the edge of the river. They were previously mistaken for *I. sericina*, Jickeli ('Butterfly Hunting in Many Lands,' by G. B. Longstaff, 1912, p. 424), which had been recorded from the district by Herr Hägg. They have, however, a much flatter spire and a longer body-whorl.

The largest example is from Hillet Abbâs; it measures, alt. 9.25, diam. 6 mm. The smallest, from Gebel Én, has an alt. of 6 mm.

Jickeli unites *I. truncata* with *I. contorta*, Mich., considering it a young stage of that species, but this can hardly be the case for they differ in form, and my biggest shell exceeds in size the dimension he quotes for *I. contorta*. It may more probably be a variety of *I. brocchii*, Ehrb., to which it bears a greater resemblance, as they both have a narrower aperture than *I. contorta*.

Bourguignat states that it is widely spread in Syria and Egypt and that it occurs both living and fossil in Algeria. Germain records it from Lake Tchad.

ISIDORA CONTORTA, Mich.

Physa contorta, Michaud, 1829, Bull. Soc. Linn. Bordeaux, vol. iii. p. 268, figs. 15, 16.

Only one specimen was found, on Masran Island, but many were taken in Lake Shâmbê, most of which were immature. Three or four shells have strong raised threads running down the whorls along the course of the lines of growth.

This species was previously found in the White Nile by Prof. Schweinfurth and recorded by von Martens. It has a very wide range, being reported from Southern Europe, North, West, and South Africa, Abyssinia, and the Euphrates.

ISIDORA DYBOWSKII, Fischer, var.

Bullinus dybowskii, Fischer, 1891, 'Moll. Miss. Dybowsky,' p. 365, pl. 3. figs. 4, 4 a.

A single example was taken alive at Kâkâ. It appeared to me like the shell figured by M. Pallary in 'Cat. Faune Malac. Égypte,' pl. 3. fig. 34, as a variety of *Isidora dybowskii*. I therefore sent it to him, and he confirmed my identification and stated that it was not quite mature. This is a new record of the species in the White Nile.

It has previously been found in Lower Egypt, and also sub-fossil in the Algerian Sahara at El Goléa (Pallary).

ISIDORA (PYRGOPHYSA) FORSKALI, *Ehrb.*

Isidora forskali, Ehrenberg, 1831, 'Symb. Phys.' No. 3, p. 174.

One specimen was found alive in Lake Shâmbê. It is of medium size, consisting of four and a half whorls which measure, alt. 6.75 mm.

The species is reported from North, East, West, South, and Central Africa, Aden, Mauritius, and the Cape Verde Islands.

Suborder **STYLOMMATAPHORA.**

Family TESTACELLIDÆ.

STREPTOSTELE? sp.

One dead specimen at Sheik Tombê.

STREPTAXIS? sp.

Four dead shells at Sheik Tombê too imperfect to identify.

STREPTAXIS SUDANICA, sp. nov.

Three specimens at Sheik Tombê. A description by Mr. Hugh Preston will be found in Appendix I., p. 265.

Family LIMACIDÆ.

HELICARION? sp.

One dead specimen at Sheik Tombê.

MARTENSIA sp.

Two dead immature shells at Rejâf Wooding Station. Four in similar condition, probably the same species, found among scrub at Rejâf.

Family STENOGYRIDÆ.

Genus LIMICOLARIA, *Schumacher.*

LIMICOLARIA FLAMMATA, *Caill.*

Cochlogena flammata, Cailliaud, 1823, 'Voyage à Méroë,' vol. ii. pl. 60. figs. 4, 5, vol. iv. 1827, p. 265.

I obtained about eighty specimens of this species. They show a considerable amount of variation, and at localities where a series was taken shells of the stouter typical form were associated with others varying in their degree of slenderness.

Now a slender form has been described by Shuttleworth * under the name of *candidissima*, and it is represented as pure white in the figures, though he states there are traces of straw-yellow streaks on the last whorl, and that the epidermis is thin, pale, and horny. He had only one example, which was from Kordofan.

Von Martens † refers to the traces of brown streaks on this specimen, though at first sight it appears white, and he regards these streaks as similar to those on *L. cailliaudi*, Pfeiff. (*L. flammata*). Jickeli ‡ also states that, though he has figured a unicolorous example, he has specimens before him with stripes more or less the same as those on *L. sennaariensis*, Shutt. (*flammata*).

Von Martens § has described and figured a small shell from the Bahr el-Ghazâl resembling *L. candidissima* in shape, but smaller and having very decided brown streaks, as variety *gracilis*.

Still another elongated shell has been described by Dr. Pilsbry || from the Omo River, similar to the last in form and colour, but more elongated; it is named var. *smithi*.

The streaks or flammules with which the shells of this group are ornamented vary in width, distance apart, and also in depth of colour, which may be light yellowish-brown, dark brown, or almost black. Owing to the habit that molluscs have of burying themselves in the earth, it is common to find shells, both stout and slender, bleached on one side, while more or less of the epidermis and flammules may be preserved on the other.

It is most unfortunate that a name of the significance of *candidissima* should have been given to a holotype; also it is unfortunate that the representative of the var. *gracilis* should have been a small form. Since Jickeli and M. Pallary both comprise the slender shells agreeing in shape, whether striped or unicolorous, under the varietal name of *candidissima*, I think it advisable to follow their example.

In my collection the groups found at different localities, besides varying among themselves in the width of the spiral angle, have also each a distinctive facies, showing slight differences in form and colour according to their respective habitats.

In consequence of this fact, I consider it most convenient to record the specimens topographically, when I shall reserve the word *holotype* to signify *L. flammata*, sensu stricto.

It would of course be possible to make a number of sub-varieties based on slight peculiarities, but these would be of no value without a knowledge of

* 'Notit. Malac.' vol. i. 1856, p. 49, pl. 6. figs. 7, 8.

† Malak. Blätt. 1865, p. 197.

‡ 'Fauna Land- u. Süßwasser-Moll. N.O.-Afrikas,' p. 161.

§ Malak. Blätt. vol. xvii. 1870, p. 34.

|| 'Man. Conch.' vol. xvi. 1904, p. 283, pl. 22. figs. 37, 38.

the different animals. As most collectors visit these regions during the dry season, it is difficult to obtain living specimens.

Gebel Ên: one example similar to the holotype but bleached, alt. 61, diam. 25 mm.

Renk: here I secured thirteen specimens especially characterised by their large size and distinct light brown flammules. The biggest has ten whorls, and measures, alt. 75, diam. 30, apert. alt. 28, diam. 13 mm. This is really a large typical specimen; it is similar to a shell figured by Dr. Kobelt (Martini u. Chemnitz, Syst. Conch.-Cab. ed. 2, vol. i. p. 71, pl. 23. fig. 3), which he regards as a variety of *L. sennaariensis*. The longest shell measures, alt. 79, diam. 28; apert. alt. 28, diam. 12 mm. This is slightly larger than fig. 4 of Dr. Kobelt. Another individual is still more slender, measuring alt. 70, diam. 24 mm. Specimens were taken by Herr Hägg at this locality, one of which he refers to Dr. Kobelt's fig. 4 and names var. *crassior*. His shell has the aperture somewhat wider than mine.

Mashra Zarâfa: nine examples all slender, two with slightly convex whorls and especially resembling var. *candidissima* in shape, but distinctly streaked with brown. The others have more flattened whorls: one is semi-transparent and pure white; it is, however, uncertain whether it is really an albino. It measures, alt. 48, diam. 18 mm.

Kâkâ: seven very beautiful shells. One is typical, the others are more slender; they are distinguished from those from Renk by having the body-whorl more flattened and elongated. They have on the whole rather broad distinct brown flammules; on one example, however, these are finer and more broken. This last has nine whorls, which measure alt. 69, diam. 25 mm. Another shell is bleached, with only faint yellowish flammules on the body-whorl; it is almost identical in shape and dimensions with Shuttleworth's figure of the holotype of *L. candidissima*.

Kôdôk, one; Lûl, one, bleached; Dûlêb, one good example of the typical form and one of var. *candidissima*.

Lake Shâmbê: here we have a very distinct group of five shells possessing especially dark flammules close together, somewhat convex whorls, with an impressed line below the suture on the body-whorl, which in two cases has begun on the penultimate whorl. All are referable to the holotype, but they vary slightly in their spiral angle. The broadest measures, alt. 54, diam. 23 mm.; a more slender shell has an alt. of 60·5 mm. with the same diameter.

Kanîsa, two of typical form; Malek, one, var. *candidissima*; Sheik Tombê, one; Kîrô, one; Mongalla, six specimens, of which five are small typical examples, the sixth is more elongated, alt. 55, diam. 20·5 mm., and is very like Dr. Pilsbry's figure of the var. *smithi*; Lâdô, three near the holotype.

Rejâf Wooding Station: about twenty, mostly young, two typical, the others

more slender, the largest of these greatly resembles the figure of *gracilis*, v. Mart. ; it measures, alt. 43, diam. 17, apert. alt. 17·5, diam. 7·5 mm., but it is not mature.

Other slender forms of this group are *L. longa*, Pilsb., and *L. koenigi*, Boettger, neither of which have I met with.

The holotype of *L. flammata* is from Mouna, a few miles north of Sennaar on the Blue Nile. This species, or one of its varieties, ranges southwards from this locality to the Lakes Albert and Tanganyika, also to the district between the Lakes and Zanzibar, and eastwards to Abyssinia.

LIMICOLARIA HEUGLINI, von Martens.

Achatina (Limicolaria) heuglini, von Martens, 1866, Malak. Blätt. vol. xiii. p. 94, pl. 4. figs. 1, 2.

Three specimens were found at Hillet al-Nûwêr. They may be distinguished from *L. flammata*, var. *gracilis*, v. Mart. by their flatter spire and lower penultimate whorl.

The holotype came from Southern Abyssinia. The species was taken by Dr. le Roi on the Bahr el-Gebel and the Bahr el-Ghazâl ; also in the latter district by Dr. Schweinfurth.

My largest example measures, alt. 34, diam. 16 mm. Von Martens' longest shell measures, alt. 35, diam. 16 mm.

LIMICOLARIA KAMBEUL, Brug., var. TURRIS, Pfeiff.

Bulinus kambeul, Bruguière, 1789, 'Enc. Méth.' vol. vi. pt. i. p. 332.

Var. *turris*, Pfeiffer, 1861, Proc. Zool. Soc. London, p. 25, pl. 2. fig. 3.

Limicolaria adansoni, Jickeli, 1874, 'Fauna L. u. S. Moll. N.O.-Afrikas,' p. 154, pl. 6. figs. 3 & 4.

Two large and two very small specimens were found at Rejâf Wooding Station, also ten immature ones five miles further south at Rejâf. Some examples are bleached, but on others the periostracum with its deep brown flammules is well preserved. The two larger shells agree with Pfeiffer's figure, and also with Jickeli's figures 3 and 4 on pl. 6 (*op. cit.*), which he calls *L. adansoni*, Pfr., and considers identical with *L. turris*, Pfr. Pilsbry *, however, regards *L. adansoni* and *L. turris* as distinct varieties of *L. kambeul*, Brug., the former being the western, and the latter the eastern variety. My two larger specimens measure respectively, alt. 113, diam. about 52 mm. (last whorl broken) ; alt. 95, diam. about 50 mm., alt. of aperture 46, diam. of apert. 24 mm. (peristome and base broken).

Dr. Boettger † records that Dr. le Roi found four specimens in this district, one at Rejâf, two at Kîrô, and one at Gemesa (Kanîsa ?).

* Tryon, 'Man. of Conch.' ser. ii. 1904, Pulmonata, vol. xvi. p. 252, pl. 25. figs. 9, 10, 11.

† Proc. Malac. Soc. 1913, vol. x. pt. vi. p. 355.

This variety is reported from the sources and tributaries of the Upper Nile, and also from Lake Tehad.

M. Germain states that it has been taken at Querké, on the French border of Liberia.

LIMICOLARIA TURRIFORMIS, von Martens.

Limicolaria turrimformis, von Martens, 1895, *Nachrichtsbl. Mal. Ges.* p. 182; von Martens, 1898, *Deutsch-Ost-Afrika*, Bd. iv. *Beschalte Weichthiere Ost-Afrikas*, pp. 102, 103, pl. 4. figs. 11, 13, & 15.

A single specimen was found at Sheik Tombê. It appears to be intermediate in form between the varieties *neumannii*, v. Marts. and *solida*, v. Marts. Alt. 63, diam. 29; aperture, alt. 27, diam. 14 mm.

This species has been recorded previously from the neighbourhood of the Victoria Nyanza, whence came the holotype and two varieties just quoted; also from Lake Tehad, but apparently not from the Bahr el-Gebel.

LIMICOLARIA ROHLFSI, Kob:

Limicolaria rohlfsi, Kobelt, 1895, 'System. Conch.-Cab.' von Martini und Chemnitz, p. 72 & pl. 23. figs. 5, 6.

This species was taken at Hillet Abbâs (two), Hillet al-Nûwêr (four), south end of the Bahr el-Zarâfa (five), Malek (one), Sheik Tombê (two), and Kîrô (four), making in all eighteen specimens. Dr. le Roi also found it at Tombê and Gemesa (Kanîsa?). The holotype came from the Ngadda River, and the species is further reported from the neighbourhood of the Victoria Nyanza, Albert Nyanza, and Albert Edward Nyanza. My largest specimen is from Hillet Abbâs; it measures, alt. 42.5, diam. 18 mm.

The occurrence at this locality is interesting, as it does not appear to have been previously recorded so far north.

The type measures, alt. 38, diam. 17 mm.

LIMICOLARIA SMITHI, Preston.

Limicolaria smithi, Preston, 1906, *Proc. Malac. Soc. London*, vol. vii. pp. 89, 90.

Limicolaria prestoni, Boettger, 1913, *ibid.* vol. x. pt. vi. p. 359.

Four specimens were found at Sheik Tombê and one at Malek.

The holotype is from the northern shore of Victoria Nyanza. Mr. Preston informs me that numerous other examples in different stages of growth have been obtained in Uganda.

Genus BURTOA, *Bourguignat*.BURTOA NILOTICA, *Pfr.*

Bulinus niloticus, Pfeiffer, 1861, Proc. Zool. Soc. London, p. 24.

Limicolaria nilotica, Pfeiffer, 1876, 'Nov. Conch.' vol. iv. no. 676, pl. 110. figs. 1, 2
3, p. 5.

This species was only met with on the Bahr el-Gebel. Thirteen specimens were taken : near Lake Shâmbê (one), at Malek (six), Sheik Tombê (three), Kîrô (one), and at Lâdô (two). All were dead, and only two from Malek have the epidermis preserved ; a bleached shell from this locality has the peristome greatly thickened.

Burtoa nilotica is a very variable species, and some of the forms have received distinct names.

Dr. Boettger records two specimens from near Gemesa (Kanîsa ?) on the Bahr el-Gebel, and von Martens reports it from the Bahr el-Ghazâl. It occurs throughout the Lake Region, and has been found as far south as Matabeleland (*Conolly*). Mr. Preston informs me he has taken it at Kismayu, while Germain records it from Lake Tchad.

Family SUCCINEIDÆ.

Genus SUCCINEA, *Draparnaud*.SUCCINEA CLEOPATRÆ, *Pallary*.

Succinea cleopatræ, Pallary, 1909, 'Cat. Faune Malac. Égypte,' Mém. Inst. Égypt. vol. vi. fasc. i. p. 45, pl. 3. figs. 29, 30.

Succinea ægyptiaca, Ehrenberg, 1830, 'Symb. Phys.'

Succinea indica, Jickeli, 1874, 'Fauna N.O.-Afrikas,' p. 167, pl. 6. fig. 11 (non Pfeiffer).

Two specimens were found at Gebel Én under a log near the edge of the river, one alive, the other dead. They agree with the figures of M. Pallary and also with that of *S. indica*, Jickeli, which species M. Pallary considers distinct from *S. indica*, Pfeiff., therefore he has given it the above name. At the same time he states that it is probably conspecific with *S. ægyptiaca*, Ehrenberg, but as this species was described from an immature specimen it is hardly possible to refer other shells to it with certainty.

It occurs near Alexandria and Damietta. If conspecific with *S. ægyptiaca*, Ehrenb., it has previously been taken in the White Nile by Prof. Schweinfurth and recorded under that name by von Martens in Malak. Blätt. 1873, p. 41.

Family VAGINULIDÆ.

Genus VERONICELLA, *Blainville*.VERONICELLA NILOTICA, *Cockerell*.

A second specimen of this rare species was taken at Hillet al-Nûwêr, about which Mr. Robson gives further details in Appendix II., p. 266.

Class PELECYPODA.

Order EULAMELLIBRANCHIATA.

Suborder SUBMYTILACEA.

Family ÆTHERIIDÆ.

Genus ÆTHERIA, *Lamarck*.ÆTHERIA ELLIPTICA, *Lamarck*.

Ætheria elliptica, Lamarck, 1807, Ann. Mus. Hist. Nat. Paris, vol. x. p. 401, pl. 29 and pl. 30, fig. 1.

Numerous specimens were taken at Ad-Duwêm, Abba Island, Masran Island, Gebel Ên, near Gebel Ahmad Aghâ, and at Mashra Zarâfa Wood Station. At several places clusters were observed formed of examples of both the smooth, typical form, and the variety *tubifera*, Sowerby*, adhering together, this variety being generally the more abundant. The theory that the latter is characteristic of calm and the former of more turbulent waters can hardly be maintained. This species varies not only in ornamentation but also in shape, and sometimes the shells form such masses as to be an impediment to navigation.

Ætheria elliptica has been recorded from the whole Nile basin, the Lakes Victoria, Tanganyika, Dembea, Rudolf, and Tchad; from the Blue Nile, where I, as well as other collectors, have also taken it; and from West Africa; a very similar form is stated to occur in the Congo.

* Zool. Journ. vol. i. 1825, p. 523, pl. 19.

Family UNIONIDÆ.

Genus NODULARIA, *Conrad*.Section *Cælatura*, *Conrad*.NODULARIA (*UÆLATURA*) NILOTICA, *Caill*.

Unio niloticus, Cailliaud, 1823, 'Voyage à Méroë,' vol. ii. pl. 61. figs. 8, 9; vol. iv. p. 263.
 ? *Unio senaariensis*, Küster, 1862, 'Conch.-Cab.' p. 280, pl. 94. fig. 6.

Abundant in the lower part of the Bahr al-Abyad, where I found a hundred and forty-two specimens; the greater number occurred at Mogran and Ad-Duwêm, only four were taken on Abba Island and one at Kosti. All are small, and few, if any, mature, but some have such a remarkably thick test that it is possible they may be a dwarf form which never attains full dimensions.

M. Pallary lays great stress both on the colour of the nacre, and the presence of wrinkles (flabellations) as characters essentially separating the species *N. nilotica* and *N. ægyptiaca* from one another. I have, however, found the colour too variable to be a distinction of specific value.

Sixty-six of the specimens I took have the nacre salmon-pink, twenty-six purplish-pink, and fifty white.

The absence of wrinkles is possibly more constant, for I have not observed them on any of the White Nile examples of *N. ægyptiaca*, nor on those I found in ponds near the Pyramids of Gizéh. They are generally present on *N. nilotica*, sometimes on both ends, at other times on one end only, or they may be absent altogether.

I obtained fair-sized specimens of *N. nilotica* at Manshiya, near Mena, fourteen in number, ten with purplish-pink nacre and four white.

I also got twelve examples from the same locality of a form which M. Pallary has figured as *N. gaillardoti*, Bourguignat MS. They appear to me more worthy of ranking as a variety than a distinct species, for there are shells intermediate in character which it is very difficult to place. With one exception these have all purplish-pink nacre. I also obtained two remarkably short specimens. M. Pallary has suggested that *N. gaillardoti* may be an intermediate form between *N. nilotica* and *N. parreyssi*.

The examples of *N. nilotica* from the White Nile show a certain amount of variation. M. Pallary informs me that two have received distinctive names from Bourguignat: one which occurred at Ad-Duwêm was called *Unio eurysellinus*, and M. Pallary has figured it (Bull. Inst. Égypt. ser. iv. no. 3, p. 94, pl. 2. fig. 4). The other, a swollen, sub-quadrate form, was named *U. phibiscus* or *emeritus* in lit. I found it both at Mogran and Ad-Duwêm; an example from Mogran measures long. 37, alt. 24, crass. 16.5 mm. One of the former measures, long. 36, alt. 23, crass. 14.5 mm.

Unio sennaariensis, Küster (fig. 6), is also probably an immature form of this species. Herr Boettger regards it as a variety and records a single specimen from Gebel Ahmed Aghâ.

Some of the shells have the dorsal margin lower posteriorly than *U. eurysellinus*, and come nearer to the type in form. These generally have the nacre either white or tinged with salmon-pink within the umbo.

It would be unwise to found new varieties on any of these shells since neither Bourguignat's nor mine are quite mature.

The largest specimen I got at Manshiya measures, long. 54, alt. 31, crass. 24 mm. Herr Hägg states that the Swedish Expedition obtained twenty specimens, of which the dimensions exceed any that I have found in either district, having long. 73.5, alt. 42, crass. 32 mm.

The holotype is from Joseph's Canal, Lower Egypt. The species is reported from Upper Egypt, also previously from the White Nile, and Mr. A. E. Smith has recorded it from Lake Tanganyika.

NODULARIA (CÆLATURA) ÆGYPTIACA, *Cailliaud*.

Unio ægyptiacus, Cailliaud, 1823, 'Voy. à Méroë,' vol. ii. pl. 61. figs. 6, 7; 1827, vol. iv. p. 263.

I found this species less numerous but more widely distributed than *N. nilotica*. Sixteen specimens were taken, none are mature; the shell structure is thin, externally brownish green in colour, the nacre is pinkish purple, in some examples the pink tone predominates and in others the blue. No wrinkles ("flabellations") observed.

The largest specimen was found at Mogran; it measures, long. 40, greatest alt. 28, crass. 16 mm. Others occurred at Ad-Duwêm, Tawila, Kosti, Hillet Abbâs, Masran Island, south of Melût, Wâw, Taufikîyâ, and Lake Shâmbê.

This species has been reported from Upper and Lower Egypt, in which district I have also taken examples, the Upper Nile basin, and Central Africa.

Var. SHAMBIENSIS, var. nov. (Pl. 18. figs. 4-7.)

Diagnosis.—More oval in contour than the type, more swollen, dorsal margin more curved. Exterior brown, the nacre varies from pink to purple, in two it is rose-pink merging into salmon-pink within the umbo, while in another it is bluish-white with salmon-pink within the umbo. Some of the examples are remarkably solid, and when this is the case the lamellar anterior teeth of the right valve become greatly thickened, divided, and jagged.

This is a very distinct form having the muscle-scars and the teeth, when the test is thin, of *N. ægyptiaca*, while the shape is something like *N. nilotica*, but none of the specimens has the wrinkles of that species. The higher posterior rostrum distinguishes it from *N. parreyssi*, though the teeth when the test is thick resemble those of that species.

I sent examples to M. Pallary, and he suggested it might be a variety of *N. rugifer*, Küster, who, however, calls his species the "runzeltragende Flussperlmuschel." and as I have just remarked, my shells have no wrinkles; the shape also is different, the umbo being further from the anterior end, the hinge-line shorter, and the posterior slope more gradual.

Dimensions.—One specimen measures, long. 39·5, alt. 23, crass. 16·5 mm. Another is slightly shorter, the long. being 38 mm., while the alt. and crass. are the same.

Locality.—Lake Shâmbê. Eighteen individuals.

NODULARIA (CÆLATURA) PARREYSSI, Philippi. (Pl. 18. fig. 8.)

Unio parreyssi, v. d. Busch in lit., Philippi, 1848, 'Abbildg. Beschreib.' vol. iii. p. 81, pl. 5. fig. 6.

Unio parreyssi, Küster, 1862, 'Conch.-Cab.' p. 268, pl. 90. fig. 6.

? *Unio sennaariensis*, Küster, *ibid.* p. 280, pl. 94. fig. 5 (non fig. 6).

About ninety specimens were taken between the mouth of the White Nile and Lake No, at the following localities: Mogran, Ad-Duwêm, Tawila on Abba Island, Masran Island, Gebel Én, Mashra Zarâfa Wood Station, south of Melût, and Taufikiyâ.

Philippi states that it occurred at Sennaar, White Nile (*Kotschy*).

It has also been recorded from the Bahr el-Ghazâl by von Martens. The Swedish expedition found only one example in the White Nile, for which no locality is given. According to M. Pallary, "Très commun dans tout le cours du Nil et de ses dérivés."

This species may be distinguished from *N. nilotica*, Caill., with which it has been united by some writers, by its more curved dorsal margin, lower posterior rostrum, more flattened and generally more eroded umbo, the most swollen part of the valve being lower, and by the thick and frequently jagged anterior tooth in the right valve. The wrinkles vary as in *N. nilotica*. A young specimen from Mogran is remarkable for having wrinkles over the umbo as well as on both ends. The colour of the nacre, however, is rarely so deep in tone: it is white, white tinged with blue, purplish pink, coral pink, or orange, the richest colour being within the umbo. The exterior is dark brown, sometimes with a greenish or yellowish tint. It differs from *N. mossambicensis*, Peters, in having the anterior end shorter and lower.

Philippi's holotype measures, long. 42, alt. 25, crass. 16 mm.

One of my shells from Ad-Duwêm measures, long. 39·5, alt. at umbo 22·5, greatest alt. 24·25, crass. 17 mm.

A large individual from Mashra Zarâfa Wood Station is dead and somewhat worn, and I feel doubtful about referring it to this species, but it appears more like it than any other. It measures, long. 43·5, greatest alt. 26·5, alt. at umbo 25·5, crass. 19 mm.

This species shows a certain amount of variation in form. Von Martens (Malak. Blätt. vol. xxi. 1873, p. 43) refers to a small specimen found by Prof. Schweinfurth in the Bahr el-Ghazâl as *Unio sennaariensis*, var. *schweinfurthi*, but as there is only one he hesitates about founding a new species on it. Later, in 'Nov. Conch.' of Pfeiffer, vol. iv. 1876, p. 140, pl. 132. figs. 3-5, he describes it as *Unio parreyssi*, var. *schweinfurthi*. Unfortunately the shell is immature; it resembles several in my collection, but it is impossible to know whether it would have grown up in any way distinct from the type in form, and the red colour of the nacre has no value as a specific distinction.

There are however two, if not three, distinct varieties.

Var. OBLIQUA, nov. (Pl. 18. fig. 11.)

Diagnosis.—Jickeli (Nova Acta Akad. d. Naturf. vol. xxxvii. 1874, p. 274) mentions two shells found by Prof. Schweinfurth in the Bahr al-Ghazâl which he does not name. They are described as having the dorsal margin much higher posteriorly and lower anteriorly. Thus the shells have an oblique appearance. Also the dorsal margin is more or less angular at the anterior end.

Locality.—I took this variety at Tawila (two separate valves), Masran Island (three), Melût (six). There are also two specimens from this last locality intermediate between the variety and the type in shape.

Dimensions.—The dimensions given by Jickeli are, long. 30, alt. 17.75, crass. 11.5 mm.

One example from Melût is near this, while another is still larger, measuring long. 39.5, alt. at umbo 19, greatest alt. 24, crass. 16 mm.

Var. ELONGATA, nov. (Pl. 18. figs. 9, 10.)

Diagnosis.—Shell more elongated, having the umbo nearer the anterior end. The adult has the test thicker and more swollen and the teeth are generally very strong and jagged.

The two valves from Tawila, which I have referred to the last variety, resemble this in their great strength but are oblique in form.

Locality and Dimensions.—The variety *elongata* occurred at Ad-Duwêm (two), Tawila (three), and Gebel Ahmad Aghâ (one). The last measures, long. 42, alt. at umbo 21, greatest alt. 23.5, crass. 20 mm. The largest from Tawila measures, long. 40.5, alt. at umbo 21.5, greatest alt. 23.5, crass. 18 mm.

A small specimen found at Mogran and another at Khor Surkab near Kerreri are shorter than usual and much swollen, also the posterior dorsal margin is lower. The former measures, long. 31.5, alt. at umbo 19, greatest alt. 19.5, crass. 15.5 mm.

Two individuals from Ad-Duwêm have the test much thinner, the teeth less strong, and the exterior a brighter green than usual; the nacre is bluish white.

NODULARIA (CÆLATURA) SOBAËNSIS, sp. nov.

Five specimens were taken at Sôba on the Blue Nile.

A description of the species by Mr. H. Preston will be found in Appendix I., p. 266.

Section *Lanceolaria*, Conrad.

NODULARIA (LANCEOLARIA) TERETIUSCULA, *Philippi*.

Unio teretiusculus, Philippi, 1847, 'Abbildg. Beschreib.' vol. iii. p. 45, pl. 3. fig. 3.

Unio cailliaudi, Férussac, von Martens, 1866, Malak. Blätt. p. 13.

Unio lithophagus, Parreyss in MS.

Unio lithophagus, Ziegler in MS.

Only a left valve was found at Tawîla on Abba Island. It agrees in form with the holotype, but is smaller. It measures, long. 39·5, alt. 17 mm.

The holotype is also from the White Nile, and measures, long. 51, alt. 21, crass. 19 mm.

This species has had the names *cailliaudi* and *lithophagus* bestowed upon it, which have apparently only existed in manuscript, for they had not been published previous to Philippi's description. Von Martens gives the name *cailliaudi* priority, though there is no certain evidence of Férussac having published it. Philippi credits the name *lithophagus* to Parreyss, while von Martens refers it to Ziegler. *N. teretiuscula* is also recorded from the Bahr el-Ghazâl, Albert Nyanza, Nubia, and Egypt. I have seen the specimen in the British Museum (Nat. Hist.) from Abu Zeit referred by Captain Flower to this species, and find it belongs to the following variety.

Var. *PALLARYI*, nom. nov. (Pl. 18. figs. 12-14.)

Var. *lithophaga*, Ziegler, Pallary, 1902, Bull. Inst. Égypt. ser. iv. no. 3, p. 95.

Diagnosis.—This variety differs from the type in being lower, more elongated, and more pointed posteriorly, in the umbo being nearer the anterior end, and in the anterior lateral teeth of the left valve being nearer together. The valves are also much swollen. The exterior is dark brown, the nacre bluish white, tinged with salmon-pink inside the umbo, and in one example from Ad-Duwêm this colour has spread all over the interior.

M. Pallary is mistaken in referring this form to *Unio lithophagus*, Ziegler, which is a synonym in manuscript of the typical name, and according to von Martens (Malak. Blätt. 1866, p. 13) has similar dimensions. I therefore propose calling it after M. Pallary.

According to my experience the variety is much more abundant than the

type in the Bahr al-Âbyad. It was found at Mogran (fifteen), Ad-Duwêm (seventeen), on Abba Island, both opposite Fachi Shoya (three), and at Tawila (thirteen), Kosti (two), Hillet Abbâs (five, and five separate valves), Masran Island (one), Gebel Ên (six), north of Gebel Ahmad Aghâ (two very small), south of Melût (three), Lûl (one), Taufikiyâ (one valve). Total sixty-eight. Reported also from the White Nile by M. Pallary. My largest specimen occurred a little to the south of Melût; it measures, long. 44, alt. 17.5, crass. 16.5 mm.

Genus *MUTELA*, *Scopoli*.

MUTELA NILOTICA, *Sow*.

Iridina nilotica, Sowerby, 1824, Zool. Journ. vol. i. p. 53, pl. 2. fig. 1.

Iridina nilotica, Cailliaud, 1827, 'Voyage à Meroë,' vol. iv. descr. p. 262; 1823, Atlas, vol. ii. pl. 60. fig. 11.

A single valve of a specimen of this species was found by Dr. Longstaff near Gordon's Tree, Khartûm. It is not so large as Sowerby's type, but agrees with it in form, the dorsal and ventral margins being nearly parallel. It measures, long. 96, alt. at umbo 32, alt. post. 36 mm. Sowerby states that his specimen was given to him by M. Cailliaud, and that it came from Sennaar. A shell in the British Museum (Nat. Hist.) is probably the holotype; it agrees with the figure in shape, and has the adventitious marks in the nacre, which are represented in the drawing, only *reversed* as would be the case if they were copied from the reflection in a mirror. There is no certain record of the locality of this individual. It measures, long. 144, alt. 54 mm.

The name *nilotica* appears to have been given by Férussac in MS., but Sowerby was the first to describe it, though the shell had been previously figured by Cailliaud.

This species greatly resembles the West African form, *M. exotica*, Lam. (*elongata*, Sow.), but it is distinguished by only having traces of crenulations along the hinge-line, while they are very strongly developed in *M. exotica*.

Cailliaud's figured specimen came from Joseph's Canal, Lower Egypt. The species also occurs in Upper Egypt, the Blue and White Niles, and Albert Nyanza.

Var. *ANGUSTATA*, *Sowerby*, sp.

Iridina angustata, Sowerby, 1868, in Reeve's 'Conch. Icon.' vol. xvi. pl. 2. figs. 4 & 5.

Iridina nilotica, Savigny, 1813, 'Descr. Égypte,' pl. 7. fig. 2.

Iridina nilotica, Audouin, 1826, 'Explic. Somm. Planches Moll. Égypte,' p. 46.

Twenty specimens were taken: near Mogran (seven), at Tawila (one), Gebel Ên (one), Gebel Ahmad Aghâ (four), Masran Island (five), and a single valve, south of Melût (two). This form shows a certain amount of variation. The shells found near Mogran come nearest to the holotype of

M. nilotica in having less difference between the height of the anterior and posterior ends, the posterior dorsal margin being less produced, the posterior ridge is also very distinct. The mature specimens from Gebel Ahmad Aghâ, on the other hand, have the posterior dorsal margin greatly produced, and the valves are very ventricose, so that the posterior ridge is not so sharp; also the ventral margin is more sinuated. Several individuals show faint taxodont teeth on the hinge. The exterior is dull green, the nacre greyish pink.

An individual from Mogran measures, long. 119, alt. at umbo 41, alt. post. 50, crass. 26 mm.

The largest, taken a little north of Gebel Ahmad Aghâ, measures, long. 130, alt. at umbo 44, alt. post. 56, crass. 36 mm.

This form was first described by Sowerby in Reeve, but it had previously been figured by Savigny, and was referred to *Iridina nilotica*, Fér. MS. by Audouin, who wrote the explanation of Savigny's plates. Sowerby names fig. 4 on Pl. 2. *op. cit.* *I. nilotica*, but it is really the same form as fig. 5, which he calls *angustata*, differing only in age. It appears more advisable to regard *M. angustata* as a variety of *M. nilotica* rather than a distinct species, the chief difference being a greater expansion of the posterior dorsal margin in the former.

Sowerby merely gives "Africa?" as locality. There are specimens in the British Museum (Nat. Hist.) marked "Egypt and Senegal," also "River Nile."

It is reported from Egypt, the Blue Nile, Lake Tchad, and West Africa.

Genus MUTELINA, Bourguignat.

MUTELINA ROSTRATA, Rang.

Iridina rostrata, Rang, 1835, 'Nouv. Archiv. Muséum,' p. 316.

Eighty-three specimens were taken at the following places: near Mogran (thirty-five), Ad-Duwêm (eighteen), Tawila (five), south of Melût (six), and at Lake Shâmbê (nineteen).

The largest were met with at the latter place, and five of the shells found there have the posterior dorsal margin rather higher than usual. The biggest measures, alt. 35, long. 100 mm.

Many of the younger shells have the epidermis of a beautiful iridescent green colour.

This species was found by Captain Flower south of Abu Zeit on the White Nile, but it is not recorded from this region by M. Pallary, Herr Hägg, or Herren Boettger and Haas. It occurs in Egypt, and has been reported from Lake Tchad (*Germain*), as well as from Senegal (*Jousseume*).

Genus PSEUDOMUTELA, *Simpson*.PSEUDOMUTELA PLICATA, *von Martens*.

Mutela plicata, von Martens, 1866, Malak. Blätt. p. 10.

A single specimen was taken at Gebel Ahmad Aghâ. Since only two examples appear to have been recorded previously, this is an interesting find. These are in the British Museum (Nat. Hist.); one is figured by Sowerby in 'Conch. Icon.' vol. xvi. 1868, pl. 2. fig. 3, and both are referred to by Jickeli, p. 270. The locality in the British Museum register is "Cataract at Syene," Jickeli gives Sennaar (Kotschy), and Sowerby gives no locality. Gebel Ahmad Aghâ is about one degree south of the province Sennaar; the town of this name, however, is on the Blue Nile, lat. 13° 25' N. My specimen measures, long. 87, greatest alt. 31·5, alt. at umbo 23, crass. 17 mm., and is intermediate in size between the two in the British Museum, the largest of which measures, long. 106, greatest alt. 36, alt. at umbo 27·5, crass. 20 mm. These latter are named *Iridina plicata*, Parreyss. In the Collection Morelet, 'Voy. Welwitsch,' 1868, p. 40, the species is attributed to Parreyss, but there is no description. Von Martens (Malak. Blätt. 1866, p. 10) mentions a specimen in the British Museum, and gives a diagnosis: though this is very brief, the species must be credited to him as the first really to describe it. Sowerby in 1868 describes it more fully, calling it *Mycetopus plicatus*, and referring it to Gray in MS.

P. plicata somewhat resembles *Mutelina rostrata*, but is distinguished by being subquadrate posteriorly, and gaping at both ends, by having a rather wide groove running from the umbo to the posterior end, and a larger cardinal tooth in the right valve. The shells in the British Museum are yellowish externally, while mine is darker, being greyish green, with the nacre salmon-pink, merging into bluish white at the margin.

Genus SPATHA, *Lea*.SPATHA RUBENS, *Lam.*

Anodonta rubens, Lamarck, 1819, Hist. Nat. Anim. sans Vert. vol. vi. pt. 1, p. 85.

Spatha cailliaudi, von Martens, 1866, Malak. Blätt. vol. xiii. p. 9.

An adult specimen measuring long. 112, alt. 73, crass. 42 mm., as well as the right valve of a still larger example measuring long. 145, alt. 97 mm., were obtained from a fishing boat at Kosti. Immature shells in different stages of growth were taken at Ad-Duwêm, Tawila, and Lake Shâmbê.

Von Martens considered this Nile species of *Spatha* distinct from that described by Lamarck from West Africa, and therefore called it *S. cailliaudi*. I have, however, compared my specimens from the White Nile, and also some I obtained from a pond at Shabra Maut, near Gizeh, with examples from West Africa in the British Museum (Nat. Hist.), and I consider them

conspecific, for there is no greater variation in form and colour than occurs in a large series from one district, such as I possess from Shabra Maut. The nacre is generally deep pink; my entire specimen from Kosti is pale in tone, and two shells M. Pallary has given me from Cairo and the Canal Mahmoudich are respectively pearly white and white tinged with pink. M. Pallary (Mém. Inst. Égypt. vol. vi. fasc. 1, 1909, pp. 83, 84) has shown that the forms regarded as distinct species under the names *lepsi*, Jickeli, *canaida*, Bourg., *arcuata*, Caill., and *letourneuxi*, Bourg., are merely stages in the growth of *S. rubens*. I not only have examples from the White Nile in these different stages, but also shells from Shabra Maut indicating them clearly by the lines of growth.

This species has previously been recorded from the White Nile, the Blue Nile, the Bahr el-Ghazâl, Abyssinia, Uganda, Lake Tchad, and its occurrence in Egypt and also in West Africa has just been mentioned.

The figure of *S. wissmanni* given by von Martens in 'Conch. Mittheil.' vol. iii. 1889, pp. 9, 10, is hardly distinguishable from an old example of this species. It is from the Rivers Lubi and Lubilasch, tributaries of the Congo, in S. lat. 5° 6'.

SPATHA INNESI, *Pallary*.

Spatha innesi, Pallary, 1902, 'Moll. recueillis Innes Bey,' Bull. Inst. Égypt. ser. iv. no. 3, p. 97, pl. 2. fig. 2.

Specimens were taken near Mogran, at Ad-Duwêm, Tawila, Kosti, Gebel Ahmad Aghâ, near Melût, at Kôdôk, and in Lake Shâmbê. They were most numerous at Ad-Duwêm, where twelve examples were found in different stages of growth.

The holotype measures, long. 60, alt. 37, crass. 25 mm. My biggest shell exceeds this, measuring, long. 72, alt. 42·5, crass. 28·5 mm. It is from Ad-Duwêm. The specimens vary in shape, some having the ventral sinuation more pronounced, some are more elongated, while others have the test considerably thicker. A small example from Melût is remarkably solid, more oblong in form, with the posterior dorsal margin higher.

This species bears some resemblance to the western form, *S. chaiziana*, Rang, with specimens of which I have compared it, but I fully agree with M. Pallary in considering it distinct.

The exact locality of the holotype is not given, but since Dr. Innes Bey kindly gave me an example from Kâkâ, it may also be from the same habitat.

SPATHA WAHLBERGI, *Krauss*.

Iridina wahlbergi, Krauss, 1848, Südafrik. Moll¹ p. 19, pl. 2. fig. 1.

Spatha hartmanni, von Martens, 1866, Malak. Blätt. vol. xiii. p. 10.

Four entire specimens were taken near Mogran, and a single valve at

Ad-Duwêm. None are mature. They agree with the figures of both Krauss and Jickeli, but are not so large. I compared them with two specimens in the British Museum (Nat. Hist.) found in the White Nile by Captain Flower, and also with some from Natal. They are similar in shape and muscular markings to all of these, but are not so large as the former; my largest, however, is nearly the same size as the smallest from Natal. They differ in the colour of the nacre, mine being bluish or greenish white, and the others pink. Krauss says the inner surface of his shell is white, the middle flesh-colour, while the margin is green and reddish iridescent. Much stress cannot be laid on the tint of the nacre, as it is known to vary greatly in many freshwater bivalves.

My largest example from Mogran measures, long. 68.5, alt. 34, crass. 18.5 mm. Krauss's specimen measures, long. 113, alt. 52 mm. Flower's specimen measures, long. 112, alt. 55 mm. The largest from Natal measures, long. 70, alt. 37 mm.

It is interesting to note what a wide range this species has. The type of *S. wahlbergi* is from the Apies River, the most southern source of the Limpopo River. The species has been reported from several other localities in South, East, Central, and West Africa; amongst them may be mentioned Khartûm, Sennaar, between Ad-Duwêm and Goz Abu-Goma (*Hägg*), Bahr el-Zarâfa (*Rohl*), and Lake Tchad.

SPATHA MARNOI, *Jickeli*.

Spatha marnoi, Jickeli, 1874, 'Fauna N.O.-Afrikas,' p. 264, pl. 8. fig. 3.

The right valve of a specimen of this species was found on Abba Island opposite Fachi Shoya. It measures, long. 106, alt. 52 mm. Two smaller dead and worn examples were taken in recently dredged mud a short distance up the Bahr el-Zarâfa. This latter locality is the habitat of the holotype, whose long. equals 85, alt. 40.75 mm.

SPATHA FOURTAUI, *Pallary*.

Spathella fourtaui, Pallary, 1902, Bull. Inst. Égypt. ser. iv. no. 3, p. 96, pl. 1. fig. 3.

Twenty-seven specimens were taken at the following localities: Tawîla, Masran Island, near Gebel Ahmad Aghâ, south of Melût, Taufikîyâ, Hillet al-Nûwêr, and fragments of a fair-sized specimen at the southern entrance to the Bahr el-Zarâfa. They were most abundant to the south of Melût, where nineteen examples were found. The largest is from Hillet al-Nûwêr; it measures, long. 63, alt. 29.5, crass. 17 mm.; it is slightly lower than usual. A single valve from Melût measures, long. 60, alt. 29 mm.

This species greatly resembles *S. marnoi* and may possibly be a variety of that species. It shows a certain amount of variation, and some specimens are very like the small examples of *S. marnoi* from the Bahr el-Zarâfa in form

and size, but not in colour. *S. fourtaui* is distinguished from *S. marnoi* in being smaller, thinner, having the posterior dorsal margin slightly more angular, the ventral margin more sinuated, and in the nacre being bluish or greenish white instead of pink.

M. Pallary does not state the exact locality on the White Nile where the holotype was found.

Family CYRENIDÆ.

Genus CORBICULA, *Megerle von Mühlfeldt*.

CORBICULA CONSOBRINA, *Cailliaud*.

Cyrena consobrina, Cailliaud, 1823, 'Voy. à Méroë,' vol. ii. pl. 61. figs. 10 & 11; 1837, vol. iv. p. 263.

This species occurred almost throughout the whole length of the river we traversed. I took it near Mogran, at Ad-Duwêm, Kosti, Abba Island, Hillet Abbâs, Gebel Ên, Mashra Zarâfa Wood Station, Kâkâ, Hillet al-Nûwêr, Lake Shâmbê, south end of the Bahr el-Zarâfa, and Gondokoro. It was very numerous near Mogran and in Lake Shâmbê. Most of the specimens, however, are immature; the largest is a single valve from Hillet Abbâs which measures, long. 34, alt. 30 mm. Another from Mogran measures, long. 23, alt. 20·5, crass. 14·5 mm. The colour varies from light green in young to darker green, brown or nearly black in adult examples. *C. consobrina* exists throughout the region of the Nile and in Abyssinia.

CORBICULA ARTINI, *Pallary*.

Corbicula artini, Pallary, 1902, 'Moll. recueillis par le Dr. Innes Bey dans le Haut Nil,' Bull. Inst. Égypt. ser. iv. no. 3, p. 93, pl. 1. fig. 4.

Corbicula lavigeriana (Bourguignat), Germain, 1906, Bull. Mus. Hist. Nat. Paris, p. 583, fig. 18 b.

Only found in the Bahr al-Abyad, where it occurred at the following places: near Mogran, at Ad-Duwêm, Abba Island, Kosti, Hillet Abbâs, Masran Island, and Gebel Ên. It was most numerous at this latter place; a single valve taken there is the largest example, measuring, long. 23, alt. 24 mm. A specimen from Tawila on Abba Island measures, long. 21, alt. 21, crass. 15·5 mm. M. Pallary gives the dimensions as long. 22, alt. 23, crass. 18 mm. This is a remarkably solid shell; the exterior varies from pale green when young to dark rich brown when adult, the interior is purple. M. Pallary states that this species is rarer at Alexandria and Ismailia than in the White Nile.

Genus SPHÆRIUM, *Scopoli*.SPHÆRIUM TEILHARDI, *Pallary*.

Sphærium teilhardi, Pallary, 1909, Mém. Inst. Égypt. vol. vi. fasc. i. p. 74, pl. 4. fig. 27.

About thirty-four specimens were taken. The species was determined by M. Pallary, who had recorded it from Lower Egypt, but this seems to be the first notice of its occurrence in the Sûdân. It was found both to the north and south of Lake No, at Abba Island, Hillet Abbâs, Gebel Ên, Lake Shâmbê, and possibly one immature shell from Gondokoro is referable to this species. The largest is from near Gebel Ên; it measures, long. 11·5, alt. 8·5, crass. 5·5 mm.

? PISIDIUM sp.

Only two small specimens possibly referable to this genus were found, one at Gebel Ên and the other at Lake Shâmbê. They are, however, too immature for certain identification.

Genus EUPERA, *Bourguignat*.EUPERA PARASITICA, *Desh.*

Pisum parasiticum, Parreyss in Deshayes, 1853, 'Catal. Conch. Bivalv. Brit. Mus.' vol. i. p. 280.

Limosina ferruginea, Jickeli, 1874, 'Fauna N.O.-Afrikas,' p. 293, pl. 11. fig. 16.

Five specimens were taken, four at Gebel Ên and one at Hillet al-Nûwêr. M. Pallary kindly examined this and the two following species. He states that it occurs throughout the whole course of the Nile; Bourguignat records it from Abyssinia and von Martens from the Victoria Nyanza.

EUPERA JICKELI, *Bourg.*

Eupera jickeli, Bourguignat, 1883, 'Hist. Malac. Abyssinie,' p. 134.

Limosina ferruginea, Jickeli, 1874, op. cit. p. 293, pl. xi. fig. 17.

Nine examples in Lake Shâmbê, and thirteen from Masran Island. Only one specimen was found by Dr. Innes Bey in the White Nile, and the exact locality is not stated. Bourguignat records it from Abyssinia and throughout the course of the Nile to Lower Egypt.

EUPERA LETOURNEUXI, *Bourg.*

Eupera letourneuxi, Bourguignat, 1883, 'Hist. Malac. Abyssinie,' p. 134.

Seven specimens were found near Gebel Ahmad Aghâ in the interstices of clusters of *Ætheria elliptica*, Lam. Bourguignat only reports its occurrence in the canals of Alexandria. This appears to be a new record for the White Nile.

List of Localities with their distances from Khartûm
and their latitude N.

Miles by river from Khartûm.	Latitude North.	Miles by river from Khartûm.	Latitude North.
12 Kerreri	15° 47'	Wâw	9° 40'
Khartûm	15° 37'	518 Taufikiyâ	9° 25'
14 Sôba (Blue Nile)	15° 32'	Dûlêb (R. Sobat)	9° 22'
125 Ad-Duwêm	14° 0'	612 Lake No	9° 30'
213 Sennaar (Blue Nile)....	13° 25'	Bahr el-Zarâfa ..	9° 25' - 0'
Abba Island	13° 22'	751 Hillet al-Nûwêr	8° 13'
Tawila	13° 16'	865 Lake Shâmbê.....	7° 0'
192 Kostî	13° 10'	916 Kanisa	6° 50'
Hillet Abbâs	13° 7'	Malek	6° 7'
209 Masran Island	12° 45'	Sheik Tombê	5° 43'
238 Gebel Ên	12° 37'	1072 Kirô.....	5° 22'
Renk	11° 45'	1086 Mongalla	5° 12'
353 Gebel Ahmad Aghâ	11° 0'	Lâdô Wooding Station..	5° 8'
Mashra Zarâfa	10° 50'	1107 Lâdô	5° 2'
404 Kâkâ	10° 40'	1116 Gondokoro	4° 54'
413 Melût	10° 27'	Rejâf Wooding Station..	4° 50'
459 Kôdôk (Fâshôda)	9° 54'	1128 Rejâf	4° 45'
511 Lûl	9° 47'		

BIBLIOGRAPHY.

- BOETTGER, C. R., and HAAS, F., 1913.—On a collection of Land and Freshwater Shells from the Upper Nile Region. *Proc. Malac. Soc. Lond.* vol. x. pt. vi. pp. 355–361.
- COCKERELL, T. D. A., 1910.—An apparently new Slug from the River Nile. 'Nautilus,' Boston, Mass., vol. xxiii.
- CONOLLY, M., 1912.—Revised Reference List of South African Non-Marine Mollusca. *Ann. S. Afric. Mus.* vol. xi. pt. iii.
- GERMAIN, L., 1906.—Contribution à la Faune Malacologique de l'Afrique Équatoriale. Lac Tchad.
- 1906.—Contribution Faune Malacologique de l'Afrique Équatoriale. Victoria Nyanza.
- 1906.—Sur quelques Corbicules de l'Afrique Équatoriale. *Bull. Mus. Hist. Nat.* Paris.
- 1907.—Les Moll. Terr. et Fluv. Afrique Centr. Franc. Mission Chari. Lac Tchad.
- 1911.—Étude sur les Mollusques terrestres et fluviatiles recueillis au Cours de la Mission de Délimitation du Niger-Tchad.
- 1911.—Contributions à la Faune Malacologique de l'Afrique Équatoriale, xxvi.: Mollusques nouveaux du Tchad, &c. *Bull. Mus. Hist. Nat. Paris.*
- HAAS, F., 1910.—Neue Najaden. *Nachr.-Bl. Deutsch. Malakozool. Ges.* vol. xlii. 181–183. Frankfurt a.-M.
- JOUSSEAUME, F., 1886.—Coquilles du Haut-Sénégal. *Bull. Soc. Zool. France*, vol. xi.
- KOBELT, W., 1910.—Die Molluskenausbeute der Erlangerschen Reise in Nordost-Afrika. *Abhandl. Senckenbergischen Naturforschenden Ges.* vol. xxxi.

- MARTENS, E. C. VON, 1897.—Beschalte Weichthiere. Thierwelt Deutsch-Ost-Afrika, vol. iv.
 NEUVILLE, H., and ANTHONY, R., 1906.—Liste Mollusques d'Abyssinie. Bull. Mus. Hist. Nat. Paris, xii. 319–321.
 PALLARY, P., 1909.—Catalogue Faune Malacol. Égypte. Mém. Inst. Égypt.
 PILSBRY, H. A., 1904.—Manual of Conchology, vol. xvi. Limicolaria.
 ROCHEBRUNE, A. T. DE, and GERMAIN, L., 1904.—Diagnoses Mollusques nouv. prov. de la Mission du Bourg. de Bozas. Bull. Mus. Hist. Nat. Paris, x. 141–144.
 ——— 1904.—Mollusques recueillis par la Mission du Bourg. de Bozas. Mém. Soc. Zool. France, vol. xvii.
 SIMPSON, C. T., 1900.—Synopsis of the Naïdes, or Pearly Freshwater Mussels. Proc. U. S. National Mus., Washington, vol. xxii.

APPENDIX I.

Description of New Species. By HUGH B. PRESTON, F.Z.S.

SEGMENTINA KANISAËNSIS, *Preston*, sp. nov. (Pl. 18. figs. 17–19.)

Shell small, suborbicular, with concave spire, reddish brown; whorls 4, regularly increasing, the first three sunken, the last carinate below, marked with oblique growth ridges, and sculptured with microscopic, wavy spiral striæ; suture well impressed; base of shell flat, slightly polished, sculptured as above; umbilicus rather shallow, wide, about one-fourth the diameter of the shell; columella margin very short and obliquely descending, diffused above into a not very well defined parietal callus, which reaches to the upper margin of the labrum; labrum acute, receding below, projecting above; aperture bluntly sagittiform.

Alt. 1, diam. maj. 4, diam. min. 3.25 mm. Aperture: alt. 0.75, diam. 1 mm.

Hab. Kanisa; five specimens (*Mrs. G. B. Longstaff*).

This would seem to be the shell cited as *S. angusta*, Jick.* by Pallary in his paper entitled "Mollusques recueillis par le Dr. Innes Bey dans le Haut Nil" †, from which it differs chiefly in its less polished appearance, flatter, more angular and broader form, more convex and less tightly coiled earlier whorls, less concave spire, flatter base, and wider umbilicus.

STREPTAXIS SUDANICA, *Preston*, sp. nov. (Pl. 18. figs. 15, 16.)

Shell perforate, ovately rectangular, whitish, thin, shining; whorls 6, the first very small, the second proportionately large, the third and fourth regularly increasing, the fifth and sixth rapidly increasing and eccentric; the apical whorls smooth, polished, the remainder sculptured with oblique, arcuate, rather closely set, transverse costulæ, which become finer on the

* Jickeli, 1874, 'Fauna Land- u. Süsswasser Moll. N.O.-Afrikas,' pp. 220–221.

† Le Caire, Bull. Inst. Égypt., sér. iv. 1902, p. 90.

last whorl; suture impressed, crenellated by the terminations of the transverse costulæ; umbilicus narrow, deep, somewhat ovate; columella descending in a curve, outwardly expanded, diffused above into a somewhat ill-defined, outwardly spreading, parietal callus which reaches to the upper margin of the labrum; labrum outwardly expanded and reflexed, projecting in front, receding below, and a little above to form a broad and shallow sinus; aperture ovate.

Alt. 16·25, diam. maj. 11, diam. min. 9·5 mm. Aperture: alt. 8, diam. 5·5 mm.

Hab. Sheik Tombê; one young and two adult specimens (*Mrs. G. B. Longstaff*).

NODULARIA (CÆLATURA) SOBAËNSIS, sp. nov. (Pl. 18. figs. 1–3.)

Shell rather small, ovate, covered with a somewhat thin, brownish-olive periostracum which becomes scabrous posteriorly, painted (with the exception of the extreme anterior and posterior sides) with fine, radiate, greenish, transverse bands; both valves marked with concentric lines of growth, considerably wrinkled and coarsely nodulated towards the umbonal regions; dorsal margin sloping upwards in a straight line from the anterior to the posterior side; ventral margin gently rounded; anterior side somewhat angularly rounded; posterior side broad, obtuse, rounded below; right valve bearing a somewhat elongate, erect cardinal, a very fine and rather short anterior, and an elongate, slightly curved posterior lateral; left valve bearing a weak, rather minutely nodulous cardinal, and two elongate, curved, posterior laterals; both anterior and posterior muscular scars well impressed, the anterior especially so; pallial line well marked and continuous in both valves; interior of shell pale pinkish.

Long. 19, lat. 31, diam. 12 mm.

Hab. Sôba, Blue Nile; five specimens (*Mrs. G. B. Longstaff*).

The specimens from which the present species is described have been submitted to M. Paul Pallary, who is also of opinion that they cannot be referred to any hitherto known form.

APPENDIX II.

The Dentition &c. of Veronicella nilotica, Cockerell. (Text-figs. 1 & 2.)

By G. C. ROBSON, B.A.

(By permission of the Trustees of the British Museum.)

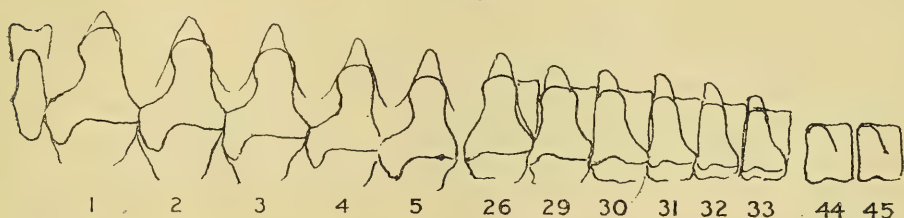
A single example of this species was obtained by Mrs. G. B. Longstaff at Hillet al-Nûwêr, an islet on the Bahr el-Gebel. It was found among papyrus on the river bank; and although smaller than the type, it corresponds very closely to the description given by Prof. Cockerell ('*Nautilus*,² xxiii. p. 108). The author did not give any account of the radula or jaw in this

description, nor has any been subsequently published. In addition, Prof. Cockerell apparently was not in possession of any information as to the actual colour of the species, his account being based on the colour of a specimen preserved in alcohol. Thanks to the careful notes of the colour made by Mrs. Longstaff, and to the kindness of Dr. H. M. Gwatkin, who lent the author the radula of the type specimen for purposes of comparison with that of Mrs. Longstaff's example, it is now possible to give a fuller account of this interesting species which, as Prof. Cockerell says, extends the range of the genus fifteen degrees further north in E. Africa.

VERONICELLA NILOTICA, Cockerell.

External appearance and remarks on general disposition of some of the internal organs, see 'Nautilus,' xxiii. p. 108.

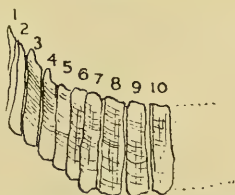
Fig. 1.



Veronicella nilotica, Cockerell.—Radula. Holotype in possession of the Rev. Dr. Gwatkin. By Nile above Khartûm. Figured under 4 oc. \times 6 obj., Reichert.

Radula.—The exact number of teeth in a row is not quite certain but is probably not more than 50; 48 may possibly be the average number in a row. The sinuosity indicated on the base of the teeth numbered 29–33 in the figure is frequently, though not always, emphasized so as to form a

Fig. 2.



Veronicella nilotica, Cockerell.—Jaw. Holotype in Zoological Dept. British Museum. Hillet al-Nûwêr, Bahr el-Gebel. Figured under 4 oc. \times 3 obj., Reichert.

marked notch or indentation. Somewhere about the twenty-ninth or thirtieth tooth in each row, a marked transition is effected toward the

square marginal type, though a modification of the lateral is appreciable earlier in the series.

Jaw.—Only one side of the jaw is figured. The complete jaw is composed of a total of 19 rather narrow plates set close together. The width of these plates varies but their disposition is not bilaterally symmetrical, there being one broad plate on one side and three on the other.

Colour.—Dorsum very dark grey, hyponotum dirty yellow turning to deeper yellow anteriorly. Covered generally with small black spots. Foot sole orange. Tentacles dark grey.

[The Collection has been presented to the British Museum (Natural History).]

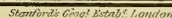
EXPLANATION OF PLATES 17 & 18.

PLATE 17.

Map showing localities of Mollusca.

PLATE 18.

- Fig. 1. *Nodularia (Caelatura) sabaënsis*, Preston, sp. nov. External aspect of right valve.
 2. " " " Internal aspect, showing hinge.
 3. " " " Dorsal aspect. Nat. size.—Sôba, Blue Nile.
 4. " " *egyptiaca*, Caill., var. *shambiensis*, Longstaff, var. nov. External aspect of right valve.
 5. " " " Internal aspect of thin shell showing hinge.
 6. " " " Internal aspect of thick shell showing strong teeth.
 7. " " " Dorsal aspect. Nat. size.—Lake Shâmbê, Bahr el-Gebel.
 8. " " *parreyssi*, Phil. Internal aspect of shell similar to Philippi's figure of type showing hinge.—Ad Duwêm.
 9. " " " var. *elongata*, Longstaff, var. nov. External aspect of right valve.
 10. " " " var. *elongata*, Longstaff, var. nov. Dorsal aspect. Nat. size.—Gebel Ahmad Aghâ.
 11. " " " var. *obliqua*, Longstaff, var. nov. External aspect of right valve. Nat. size.—S. of Melût.
 12. *Nodularia (Lanceolaria) teretiuscula*, Phil., var. *pallaryi*, Longstaff, var. nov. External aspect of right valve.
 13. " " " Internal aspect showing hinge.
 14. " " " Dorsal aspect. Nat. size.—Near Mogran.
 15. *Streptaxis sudanica*, Preston, sp. nov. Front aspect.
 16. " " " Dorsal aspect. Nat. size.—Sheik Tombê.
 17. *Segmentina kanisaënsis*, Preston, sp. nov. Front aspect.
 18. " " " Spiral aspect.
 19. " " " Basal aspect.—Kanisa.



MAP SHOWING LOCALITIES OF MOLLUSCA



MOLLUSCA FROM WHITE NILE.

Grout sc. & imp.